# Does Your System Need More Memory?

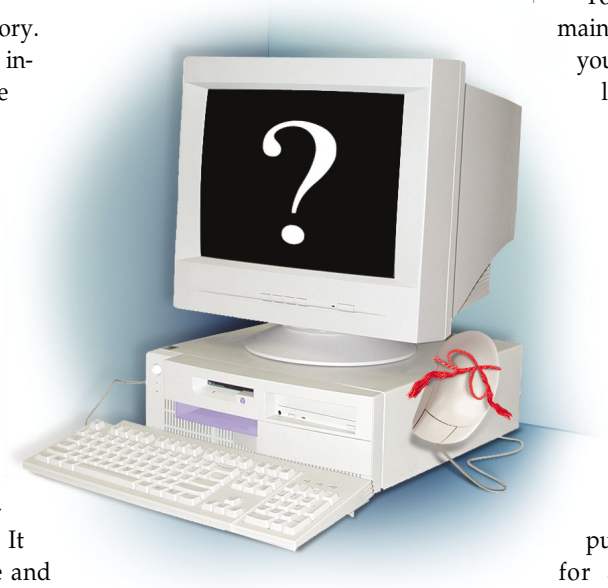
## Use The Performance Monitor To See If You're Running Low

Your PC may need more memory. Adding memory is a relatively inexpensive upgrade that can make your PC run faster and smoother. With enough memory at its disposal, startup time will be shorter, programs will launch more quickly, and there can be fewer crashes than on the same PC with cramped memory.

Adding memory to your PC may increase its speed, but if your PC has enough already, adding more won't have much effect other than draining your bank account. There's no hard-and-fast amount of memory you need. It depends on the software you use and how you use the computer. Windows' Performance Monitor will tell you whether your PC, working the way you work, will benefit from a memory boost.

Microsoft recommends 128MB of memory to run Windows XP, but many applications, such as those in Microsoft's Office suite, demand much more memory. For the average home user, 512MB is a reasonable amount. Your applications may require significantly more for optimal performance.

The Performance Monitor will throw a lot of information at you. To the uninitiated, it may seem like technical mumbo-jumbo. Once you know what to look for, those numbers can provide vivid insight into what goes on in your PC as you use it. You'll be able to find out quickly if your computer will benefit from more memory.



### Set Up The Performance Monitor In WinXP

To start the Performance Monitor, open the Control Panel and double-click Performance And Maintenance, Administrative Tools, and Performance.

Next, you need to set up the Performance Monitor to watch for conditions relevant to memory usage. The program uses counters to monitor goings-on within the operating system. There are hundreds of types of counters, but you need to look at just a few to monitor memory. Right-click the New Counter icon (the leftmost icon in the toolbar that looks like a white square with a yellow star) and choose Add Counters.

In the Performance Object drop-down menu, choose Memory. In the counters list, highlight Pages/Sec, click Add, highlight Available Mbytes, and click Add. (If it tells you that a counter is already present, that's fine, too.) Next, change the Performance Object drop-down menu to Server and add the following items: Pool Nonpaged Failures, Pool Paged Failures, and Pool Nonpaged Peak. Select Paging File from the Performance Object menu and add % Usage. Finally, select PhysicalDisk from the Performance Object menu and add %Disk Time, Average Disc Sec/Transfer, and Current Disk Queue Length. Click Close.

### Watch The Numbers

You should be back at the program's main screen. In the performance graph, you'll see the counters you chose. The lower part of the window shows the chart legend and more detailed information about those counters. What do the numbers mean? We'll get to that in a moment.

Now it's time to put the system to work. With the Performance Monitor running, launch an application that you use often. Use the computer like you normally would: If you normally have four or five applications open at once, open them all and put them to work. After you've put the PC through a normal routine for a minute or two, go back to Performance Monitor to see what went on with memory during that time.

### Pages

Windows uses the page file on the hard drive as virtual memory, which allows the operating system to work as if there's more memory than is actually installed. When you try to launch an email program, Windows may find that the memory is full. This is called a **page fault**. Windows makes room by taking something it isn't using (such as a browser) at the moment and paging out memory (moving it to the page file). When the browser is needed again, Windows pages out something else to make room for it and then pages in the browser.

By juggling data between RAM and the hard drive, Windows can do more with less. However, paging memory takes

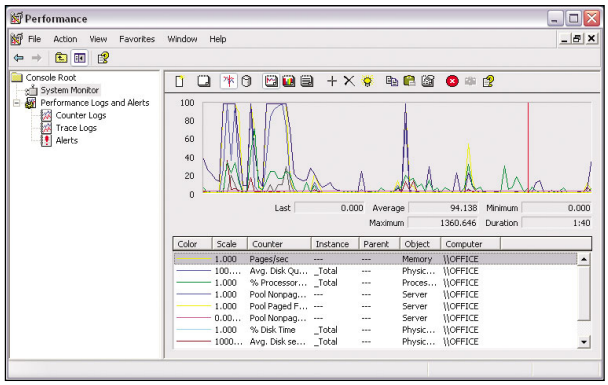
much longer than simply reading from and writing to RAM, which is why more memory makes a faster system.

**Chart your pages.** Back in the Performance Monitor, click the Pages/Sec line below the chart. This shows the amount of information Windows needs to page in from disk. The higher the number, the more data needs juggling. If the average or maximum number of pages per second is greater than 20 and the Average or Minimum Available Mbytes is less than 4MB, you probably need more memory.

Another benchmark to look at is the effect of memory paging on disk operations. Multiply the Average Disc Sec/Transfer value by the number of Pages/Sec. If the number is greater than 0.1, paging is taking more than 10% of the system's disk access time. If this happens frequently, you need more memory.

The Performance Monitor provides other memory performance numbers. Pool Paged Failures and Pool Nonpaged Failures show the number of times the system found no free space in two pools of physical RAM. Failures in either pool indicate that you need more memory: The higher the numbers, the worse the problem. The Pool Nonpaged Peak counter shows the maximum amount of memory, in bytes, in the nonpaged memory pool that were in use at a time.

To find out how much memory your PC has, go to the Control Panel and click Performance And Maintenance and System.




Spikes in the Performance Graph's paging counters indicate heavy memory usage. Extended activity means your PC needs more memory.

## Watch The Disk, Too

We set up the Performance Monitor's counters to watch disk drive activity. Because paging data requires copying data to and from the disk drive, it can be a bottleneck.

The %Disk Time counter shows the percentage of time that the disk drive was busy reading or writing data. A high disk time percentage could mean the system spends too much time paging memory. Similarly, Current Disk Queue Length shows how much data is waiting to be sent to or from the hard drive at any given time. If you see spikes there coupled with spikes in the Pages/Sec chart, the system is significantly slowed waiting for paged memory.

The size of Windows' page file is a factor, too. If the Paging File % Usage counter approaches 100%, increasing the size of the page file can increase performance. From the Control Panel, click Performance And Maintenance and System. Click the Advanced tab, select Settings under Performance, and click the Advanced tab. If you want to increase the maximum size of the file, click Change, select the radio button next to Custom Size, and type values (in MB) for both Initial Size and Maximum Size.

## The Long View

You've seen Performance Monitor's chart over the span of a couple of minutes. Its logging capability can provide a more thorough analysis of your memory use over time.

Before you turn on the log file, make sure you have plenty of free hard drive space--at least a gigabyte or two. To start logging, expand the Performance Logs And Alerts menu in the left pane and click Counter Logs. From the Action menu, choose New Log Settings, give the log a name, and click OK. Click the Add Counters button and add the necessary counters (listed in the "Set Up Performance Monitor" section above.) You can change the sampling interval, but the default rate of every 15 seconds is fine. Click Close and OK to start logging and use your system as you normally would.

When you're ready to stop logging, click the Counter Logs item again. In the right pane, you'll see the name of your log file. Right-click it and choose Stop.

Finally, you want to see the results of the logging in a graph. Click System Monitor and press CTRL-L. Select Log Files, click Add, and choose the name of your log file. The Performance Monitor graph will show your system activity during the logged time. Examine the overall level of paging activity. Look for spikes in paging activity and look for corresponding spikes in disk use.

## Search Your Memory

Every system is different. Various motherboards, hard drives, and applications can all drastically affect the Performance Monitor's stats. Thus, we can't make any definitive rules about needing or not needing more memory. Also, every computer needs to page data to virtual memory from time to time; there's nothing wrong with that. However, if the Performance Monitor shows you that your PC is spending more than a little time juggling memory around, the fix is simple: Add more memory. Your PC will run faster and be more stable, and you'll be more productive. **PCT**

***by Kevin Savetz***